NEW YORK STATE Integrated Pest Management PROGRAM

Cornell University Cooperative Extension

Elements of IPM for Grapes in New York State

Diseases	Insects	Weeds
Black Rot	Grape Berry Moth	Annual broadleaves
Botrytis Bunch Rot	Grape Leafhopper	Annual grasses
Crown Gall	Grape Rootworm	Nutsedge
Downy Mildew	Japanese Beetle	Perennial broadleaves
Eutypa Dieback	Rose Chafer	Perennial grasses
Phomopsis Cane & Leaf Spot	Potato Leafhopper	Woody perennials
Powdery Mildew	Climbing Cutworm	
Angular Leaf Scorch	Grape Cane Borer	
	Steely Beetle (Flea Beetle)	
	Grape Cane Gallmaker	
	Grape Cane Girdler	

I. Site, Rootstock, Cultivars and Planting Systems	Check if done
1. Select new vineyard sites that have good air drainage or proximity to large bodies of water for frost protection.	
2. Site selection should consider non-point-source pollution from vineyard-applied fertilizers and agrochemicals and how soil type, slope, watersheds, and groundwater relate to surface runoff, tile drainage, and persistence in and leaching through the soil profile.	
3. Whenever possible, avoid selecting sites near abandoned vineyards or directly adjacent to wooded areas where pests and diseases can be harbored.	
4. Remove abandoned vineyard blocks to reduce sources of pest infestations and disease inoculum in a manner that minimizes soils erosion.	
5. Do not plant new vineyards immediately after existing vineyard removal unless steps have been taken to remove a majority of the old root systems with a nursery digger. If removal of the root system is impractical, practice crop rotation out of grapes for at least one year, or plant a cover crop (http://nysipm.cornell.edu/elements/apple/cover_crops.asp) in the year before planting and incorporate into the soil to improve organic matter content, suppress replant disease, weeds, and, depending on cover crop species, reduce nematodes.	
6. Certified plant material should be used for Vinifera and hybrid plantings -- where possible.	
7. To improve spray coverage, new vineyards should include rootstocks appropriate for the variety that will ensure trellis fill but avoid over-vigorous growth.	

8. Select grape variety & rootstocks that are appropriate for the given site based on winter hardiness, soil type and site characteristics and pest management goals/expectations.	
9. Rows should be oriented in a north/south direction to promote light interception and air circulation to promote rapid drying.	
10. Where necessary, rows are perpendicular to slopes to minimize erosion.	
11. Establish groundcover between rows quickly to prevent erosion and suppress weeds.	
II. Soil Management, Vine Nutrition and Irrigation	**Check if done**
1. New vineyard soils should have good tilth and fertility and adequate soil drainage should be provided to prevent root diseases and promote healthy root development.	
2. Before planting, chemically analyze new vineyard soils and correct pH, micro- and macronutrients, if necessary.	
3. Chemically analyze soil and leaf tissue at appropriate regular intervals and add fertilizer, either to (1) maintain vine nutritional status or (2) correct a nutrient deficiency, based on the soil or leaf analysis results. Keep records.	
4. To maintain vine nutritional status, add fertilizer, based on soil and leaf analysis results, and do not exceed the yearly maximum amounts of 100 lb N/acre.	
5. Apply all soil nitrogen in spring during the period of maximum uptake - bud break to fruit set. Applications of more than 50 lb N/acre should be split into two or more applications, one prebloom and the other postbloom.	
6. Balance nitrogen applications with vine growth to reduce or eliminate runoff.	
7. For irrigated vineyards, use trickle or drip irrigation so that water quantity and placement minimizes disease development, optimizes water use, and minimizes erosion.	
8. Amend soil with organic matter to improve soil structure, biological activity, drainage, Cation Exchange Capacity, fertility and water holding capacity.	
III. Vine Training and Crop and Canopy Management	**Check if done**
1. Prune annually during the dormant season to promote light penetration, air circulation, optimal spray coverage and rapid drying; chip and recycle prunings in vineyard middles with flail mower or burn prunings where local regulations allow burning of brush. Trunks removed due to Eutypa, crown gall or for renewal purposes should be removed from the vineyard and buried or burned.	
2. Whenever spray coverage and pest management suffers from dense canopies, leaf pulling to expose the fruiting zone should be accomplished, where economical, for those varieties susceptible to Botrytis bunch rot.	
3. Use appropriate fruit thinning to avoid overcropping.	
4. When economically justifiable (Vinifera wine grapes), summer prune to maximize late summer spray coverage and reduce susceptible leaf tissue and canopy shading.	

IV. Pest Monitoring, Forecasting, and Management	Check if done
1. Regularly monitor pests (weeds, insects, mites, diseases & vertebrates) and their damage to assess their levels. Use visual assessments, pheromone traps, sticky traps, etc.	
2. Keep records of all monitoring information, sampling dates, pest or damage levels, trap catches, thresholds used for each block, etc.	
3. Base pesticide treatments against pests on established thresholds, pest forecast models, weather conditions, established presence of the pest, and history of damage in the vineyard or on fruit at harvest. Consult New York and Pennsylvania Pest Management Guidelines for Grapes http://ipmguidelines.org/grapes	
4. Keep records of pesticide applications, including: date, time, weather, operator, sprayer, field identification (farm, vineyard, block and rows — as applicable), targeted pest, pesticide name and EPA number, formulation, REI, PHI, rate applied, and number of acres treated. Computer software, such as TracGrape, http://nysipm.cornell.edu/trac/default.asp can streamline record-keeping.	
5. Use only pesticides registered in New York State and approved for the target pest and crop. Consult NYS current product registrations at NYS Pesticide Product, Ingredient and Manufacturer System (PIMS). http://pmep.cce.cornell.edu/pims/	
6. Among registered pesticides of comparable efficacy, base selection on the optimal combination of (1) being least toxic to humans, livestock, wildlife and the environment, (2) selectivity, having low toxicity to key natural enemies, (3) having shortest residual persistence in the environment, and (4) reasonable cost. A way to guide selection is to consider those with the lowest Environmental Impact Quotient EIQ http://nysipm.cornell.edu/publications/eiq/files/EIQ_values04.pdf value or to use the Natural Resources Conservation Service pesticide screening tool, WIN-PST http://www.wcc.nrcs.usda.gov/pestmgt/winpst.html software.	
7. Apply insecticides, fungicides, miticides, and herbicides in accordance with resistance management program guidelines when using pesticides at risk for pest resistance development.	
8. Thoroughly clean tractors, harvesters, and other equipment between use in different vineyards to avoid spreading weeds, diseases, and insects.	
IV.A. Groundcover and Weed Management	**Check if done**
1. Manage groundcover in a manner to reduce soil erosion, nutrient runoff, and herbicide use.	
2. In the row middles, establish a permanent cover crop to reduce weeds in the row middle.	
3. If cover crop is not used, monthly mowing is used from bloom to veraison.	
4. Maintain adequate weed suppression in the vineyard row in a strip <1/3rd the between-row spacing or <1/4th in irrigated vineyards.	
5. Base herbicide rates and selections on weed surveys. Keep records.	
6. Keep records of location and identity of difficult to manage weeds as well as weed species that have 'escaped' annual weed management programs.	

IV.B. Insect and Mite Management	Check if done
1. Arthropod monitoring methods and thresholds should conform to Cornell Cooperative Extension New York State IPM Program guidelines.	
2. Scouting is done every other week or at key phenological times, preferably by the same person. Scouting results are recorded and entered into a historical database.	
3. Use pheromone traps, phenological developmental models and the Grape Berry Moth Risk Assessement Protocol to develop informed management decisions for grape berry moth and grape leafhopper.	
4. When applicable, mating disruption is used as a management tactic.	
5. Release and conserve predatory insects or mites by using selective pesticide programs.	
6. Sample fruit at harvest from blocks to assess and record damage levels of direct-feeding pests and optimize future management programs.	
IV.C. Disease Management	**Check if done**
1. Cultural practices for disease management, where practical, should include removal, or burial by cultivation, of overwintering inoculum, pruning and removing cankers, and weed and canopy management to promote air circulation and rapid drying.	
2. Disease management, monitoring methods and thresholds should conform to Cornell Cooperative Extension New York State IPM Program guidelines.	
3. Scouting is done every other week or at key phenological times, preferably by the same person. Scouting results are recorded and entered into a historical database.	
4. Use disease development and forecast models to make informed management decisions for problem diseases such as powdery mildew, downy mildew, black rot, Botrytis, etc.	
5. Scout vineyards for Eutypa at 10- to 12-inches of shoot growth. Tag infected trunks and prune out infections by double cutting.	
6. To preserve predatory mites, use EBDC fungicides (mancozeb, maneb, metiram, thiram and zineb) prior to bloom only or not at all.	
7. Sample fruit at harvest from blocks to assess and record disease levels and optimize future management programs.	
IV.D. Vertebrate Management (birds, turkeys, woodchucks, deer, bears, etc.)	**Check if done**
1. Use appropriate exclusion fencing (barrier, electric, invisible fencing with dogs), or exclusion netting, trunk guards, habitat manipulation, and vineyard sanitation whenever possible.	
2. Enhance natural predator populations (kestrels, owls, fox, etc.) by manipulating or providing habitat to assist with vertebrate management.	
3. Conduct vertebrate pest population reduction through shooting or trapping only as defined by New York State Department of Environmental Conservation regulations.	

V. Safe and Efficient Spray Application Methods	Check if done
1. Use drift-reducing sprayers (tunnel, sensor, tower) or sprayers modified to direct the air (towers, deflectors, angled fans, side baffle plate, air induction nozzles).	
2. Select nozzles that optimize droplet size and don't create too many fine droplets. Nozzles must point towards the target canopy.	
3. Use buffer zones near water, neighboring crops, properties and other sensitive locations. Read pesticide label for specific- information regarding proximity of applications near water or waterways.	
4. Spray only when wind, temperature and humidity conditions are suitable for spraying unless the sprayer is modified to reduce drift, i.e. hooded boom, Cornell deflectors, low drift nozzles, shielded applicator, etc..	
5. Inspect, maintain, and calibrate crop and herbicide sprayers once per year, or more often if needed, to ensure mechanical reliability and accurate spray delivery. Keep records as described in the Vineyard Spraying website http://www.nysaes.cornell.edu/ent/faculty/landers/pestapp/grape.htm	
6. Sprayers should only be operated by certified applicators, as defined by New York State Department of Environmental Conservation regulations, wearing appropriate personal protective equipment (PPE).	
7. Sprayer application records should include details of the sprayer such as nozzles fitted, pressure, forward speed and application rate.	
8. Thoroughly clean sprayers after use or between different product applications.	
VIII. Education of Growers and Employees	**Check if done**
1. Attend two or more regional or national viticulture meetings or conferences.	
2. Maintain membership in an appropriate grower association and in a local county or regional Cornell Cooperative Extension Association.	
3. Have access to the current year's copy of the New York and Pennsylvania Pest Management Guidelines for Grapes.	
4. Participate in an IPM extension/research project.	

REFERENCES:

New York and Pennsylvania Pest Management Guidelines for Grapes. Updated yearly. Weigle, T., A. Muza, R. Dunst, A. Landers, G. Loeb and W. Wilcox. Cornell Cooperative Extension, Cornell University.

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